

DRAFT PERMIT

Permit No.: AK-003865-2

United States Environmental Protection Agency

Region 10

1200 Sixth Avenue

Seattle, Washington 98101

**AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 et seq., as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

TECK-COMINCO ALASKA, INC.
Red Dog Mine

is authorized to discharge 1) treated wastewater through Outfall 001 at latitude of 68° 4' 17" North and longitude of 162° 52' 5" West to receiving water named Middle Fork Red Dog Creek, 2) treated construction camp site wastewater through Outfall 002 at latitude of 68° 1' 45" North and longitude of 162° 54' 56" West to the tundra, and 3) storm water in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective

This permit and the authorization to discharge shall expire at midnight,

Signed this day of

Michael F. Gearheard
Director, Office of Water & Watersheds, Region 10
U.S. Environmental Protection Agency

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Summary of Submittals

DRAFT PERMIT**I. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the effective period of this permit, the permittee is authorized to discharge pollutants from the outfalls specified herein to the Middle Fork Red Dog Creek and tundra wetlands, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

A. Effluent Limitations and Monitoring - Outfall 001

The permittee must limit and monitor discharges from outfall 001 to the Middle Fork Red Dog Creek as specified in Table 1, below. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the tables at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

There shall be no discharge from Outfall 001 until there is free flow of water in Main Stem Red Dog Creek. Prior to beginning discharge, the permittee shall consult with Alaska Department of Natural Resources, Office of Habitat Management and Permitting (OHMP) and Alaska Department of Environmental Conservation (ADEC). The permittee must supply written notice documenting the start of discharge to EPA within 24 hours.

1. Table 1:

TABLE 1 – Effluent Limitations and Monitoring Requirements for Outfall 001

Parameter (in ug/L unless otherwise Noted)	Daily Maximum	Monthly Average	Weekly Average	Sample Frequency	Sample Type ¹
Cadmium ²	0.94	0.44	---	1/week	24 hour composite
Cadmium ² (proposed)	3.40	2.00	Same	1/week	24 hour composite
Calcium, mg/L	---	---	---	1/week	24 hour composite
Copper ²	34.40	17.15	<u>43.7</u> <u>15.1</u>	1/week	24 hour composite
Chromium ²	---	---	---	1/week	24 hour composite
Lead ²	17.53	8.78	<u>19.6</u> <u>8.7</u>	1/month	24 hour composite
Magnesium, mg/L	---	---	---	1/week	24 hour composite
Manganese ²	---	---	---	1/week	24 hour composite
Mercury, total	0.02	0.01	Same	1/month	24 hour composite
Selenium ²	7.80	4.23	<u>5.6</u> <u>4.7</u>	1/week	24 hour composite
Zinc ²	386.32	237.11	<u>257.3</u> <u>119.8</u>	1/week	24 hour composite
Total Suspended Solids (TSS), mg/L	30.0	20.0	Same	1/week	24 hour composite
Total Dissolved Solids (TDS), mg/L	See Permit Part I.A.7.			1/week	24 hour composite
TDS Anions and Cations ³	---	---	---	1/month	Grab

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TABLE 1 – Effluent Limitations and Monitoring Requirements for Outfall 001

Parameter (in ug/L unless otherwise Noted)	Daily Maximum	Monthly Average	Weekly Average	Sample Frequency	Sample Type ¹
Cyanide, WAD	---	---	---	1/week	Grab
Fecal Coliform, #/100 ml	---	200	400	same	1/2 months
Aluminum ²	159.35	55.20	---	1/month	24 hour composite
Iron ² , µg/L	---	---	---	1/month	24 hour composite
Total Residual Chlorine, mg/L	---	---	---	1/month	Grab
Biochemical Oxygen Demand, mg/L	---	---	---	1/month	24 hour composite
Total Ammonia as N, mg/L	10.64	6.80	---	1/week	24 hour composite
Organic Priority Pollutant Scan ⁴ , µg/L	---	---	---	see note 3	24 hour composite
Turbidity, NTU	---	---	---	1/week	Grab
Temperature, °C	---	---	---	daily	Grab
Cumulative Volume, gallons	See Permit Part I.A.2.		---	---	Continuous Recording
Whole Effluent Toxicity, TUC	12.2	9.7	---	same	1/month
pH, standard units	Within the range of 6.5 to 10.5			1/week	Grab

1. Effluent samples collected shall be representative of the effluent discharged without dilution from or contact with any outside sources. Results of analyses conducted under Permit Part I.A.1. shall be submitted monthly on the discharge monitoring report.

2. All metals shall be analyzed as total recoverable unless otherwise indicated.

3. This monitoring shall include a standard and complete suite of those cations and anions contributing to TDS including, but not limited to, carbonates, chlorides, sulfates, potassium, magnesium, calcium, and sodium. The carbonate analysis may be estimated based on direct measurement of alkalinity.

4. Volatile organics shall be monitored using EPA analytical method 624, semi-volatile organics shall be monitored using EPA analytical method 626. Testing shall be conducted once in May, July, and September.

2. The maximum cumulative volume discharged from Outfall 001 shall not exceed *same* 2.418 billion gallons from January 1 through December 31 every year.

The permittee shall report the cumulative volume discharged from Outfall 001 for that year to EPA, the Alaska Department of Environmental Conservation (ADEC), and the Alaska Department of Natural Resources/Office of Habitat Management and Permitting (OHMP) on the discharge monitoring report (DMR) each month. For example, if the permittee discharges 1 million gallons from Outfall 001 in May and 2 million gallons in June, the June DMR shall state a cumulative flow discharged from Outfall 001 of 3 million gallons (1 million + 2 million = 3 million). In addition, the permittee shall report the total volume discharged each month.

3. The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

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4. Hardness of the effluent shall be calculated monthly. The minimum, maximum, and average hardness shall be reported on the Discharge Monitoring Report (DMR).
5. Additional Monitoring and Reporting Requirements:
 - a. The permittee shall conduct analyses using analytical methods approved under 40 CFR §136. EPA has approved the use of Alternative Test Procedures (ATP) for cyanide (SM 4500CN-I), chloride (300.1), and metals (200.8) under 40 CFR 136.5 for use in this permit.
 - b. At a minimum, analytical methods should achieve the following method detection limits:

TABLE 2 – Method Detection Limit (MDL)		
Parameter ¹	MDL (current permit)	Requested MDL ²
Aluminum	20 ug/L	20 ug/L
Cadmium	.1 ug/L	0.5 ug/L
Chromium	1 ug/L	2 ug/L
Copper	1 ug/L	5 ug/L
Iron	30 ug/L	40 ug/L
Cyanide, WAD	3 ug/L	3 ug/L
Lead	.08 ug/L	1 ug/L
Manganese	1 ug/L	2 ug/L
Mercury, total	.2 ug/L	0.005 ug/L
Selenium	2 ug/L	2 ug/L
Zinc	2 ug/L	5 ug/L
BOD ₅	8 mg/L	8 mg/L
Total residual chlorine	10 ug/L	100 ug/L
Total ammonia as N	10 ug/L	0.5 mg/L

1 All metals shall be measured in total recoverable unless otherwise noted.
 2 The permittee may request less restrictive method detection limits for ambient monitoring. The request shall be submitted to EPA in writing, and is subject to EPA approval.

- c. As part of the development of the Quality Assurance Project Plan (see Part I.H.1.b) the permittee shall specify the analytical test method that will be used to achieve each method detection limit.
- d. For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is

less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, the permittee must report and use the actual value. The resulting average value must be compared to the effluent limitation to assess compliance.

- e. Valid test results from split samples shall be reported on the DMR. For reporting an average on the DMR, individual valid results for each test from a split sample are averaged first to determine a sample value. That value is averaged with other sample results obtained in the reporting period and the average of all sample results reported. For reporting the maximum on the DMR, individual valid results for each test from a split sample are averaged first to determine a sample value. That value is compared to other sample results obtained in the reporting period and the maximum of all sample results reported. For the purposes of reporting, split samples are reported as a single sample regardless of the number of times it is split. All laboratories used shall be identified on the DMR attachment.

6. Total Residual Chlorine Monitoring (TRC)

TRC shall be analyzed immediately after sample collection, using the DPD method approved by EPA (Standard Method 4500 CI-G).

7. Total Dissolved Solids (TDS) Limitations and Monitoring Requirements

- a. Mixing Zone Locations: The Alaska Department of Environmental Conservation has authorized the following mixing zones:
 - (1) Main Stem Red Dog Creek mixing zone: begins at the confluence of North Fork Red Dog Creek and Middle Fork Red Dog Creek and continues downstream for 1,930 feet. Station 151 is the monitoring station at the edge of this mixing zone.
 - (2) Ikalukrok Creek mixing zone: begins at the confluence of Main Stem Red Dog Creek and Ikalukrok Creek and continues downstream 3,420 feet. Station 150 is the monitoring station at the edge of this mixing zone.
- b. After the commencement of discharge, the permittee shall limit the TDS load discharged from Outfall 001 so as to maintain in-stream TDS concentrations at or below 1500 mg/L at the edge of the mixing zone in Main Stem Red Dog Creek.

[If the SSC for TDS is not approved, then the following language (in italics) would be included in the permit:]

This limitation is in effect until Arctic Grayling have begun spawning in Main Stem Red Dog Creek.

After the commencement of spawning, the permittee shall limit the TDS load discharged from Outfall 001 so as to maintain in-stream TDS concentrations at or below 500 mg/L (or 1000 mg/L, if approved) at the edge of the mixing zone in Main Stem Red Dog Creek measured at Station 151.

- c. *The permittee must consult with the EPA, ADEC, and OHMP regarding the end of Arctic Grayling spawning, and must receive written approval from EPA prior to increasing the TDS load discharged from Outfall 001 above the limit specified in I.A.7.c.*
- d. *After Arctic grayling have finished spawning and the permittee has received written approval from EPA,*

The permittee shall limit the TDS load discharged from Outfall 001 so as to maintain in-stream TDS concentrations at or below all of the following:

- (1) *At the edge of the mixing zone (Station 151) in Main Stem Red Dog Creek after Arctic Grayling spawning: 1500 mg/L*
- (2) *At the edge of the mixing zone (Station 150) in Ikalukrok Creek: 1000 mg/L throughout the discharge season.*
- (3) *Station 160: 500 mg/L from July 25th through the end of the discharge season.*

- e. *When discharging, monitoring by direct laboratory testing shall be conducted. All samples for TDS shall be grab samples, and the date and time of sample collection must be recorded. Sample collection shall be as follows:*
 - (1) *TDS shall be monitored once per week at Station 151, Station 150, Station 160, and the effluent. The sample for Station 151 shall be taken as close in time as practicable to one of the sample events collected at the edge of the mixing zone in Mainstem Red Dog Creek; and the sample for Station 150 shall be taken as close in time as practicable to one of the sampling events at the edge of the mixing zone in Ikalukrok Creek.*
 - (2) *Conductivity and temperature shall be monitored concurrently with TDS sampling at Stations 151, 150, and 160.*

The results of all monitoring and measurements must be submitted with the monthly discharge monitoring report (DMR).

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- f. The permittee must update the TDS/Conductivity correlation curves annually with the direct laboratory testing data for Station 151 and Station 160. The correlation curves must be updated at the end of the discharge season. The permittee must submit written notification that the update has been completed with its last DMR for the discharge season.
- g. The permittee shall calculate and record the allowable flow volume from Outfall 001 at least twice each day using the formulas below and shall submit all of the data involved in those calculations (including the time the measurements were taken), and the calculation results, each month along with the discharge monitoring report (DMR). The permittee shall base each calculation on data collected within two hours of each shift change, and shall make each calculation within one hour of the collection of data. The calculations and data for Station 160 shall be made and recorded when the TDS limit for Station 160 is in effect. The allowable flow calculated from measurements taken at Station 151 and 160, and the outfall must reflect the stream conditions at each station and the outfall flow that are occurring at approximately the same time frame (i.e., the conductivity and flow measurements at Station 151, Station 160, and the flow from the outfall must be taken within 30 minutes of each other). The following shall be collected and calculated:

EFFLUENT

- (1) Assume the effluent concentration (C_e) is equal to 10% above the highest measured effluent value.
- (2) Measure the effluent flow (Q_e)

STATION 151

- (1) Measure conductivity at Station 151
- (2) Calculate the total TDS concentration at Station 151 ($C_{151(\text{total})}$) using the measured conductivity at Station 151
- (3) Measure the total flow at Station 151 ($Q_{151(\text{total})}$)
- (4) Calculate the flow at Station 151 (Q_{151}) minus the effluent flow at Station 151 by using the equation:

$$Q_{151} = Q_{151(\text{total})} - Q_e$$

- (5) Calculate the TDS concentration at Station 151 (C_{151}) minus the TDS contribution from the effluent using the following equation:

$$C_{151} = \frac{(C_{151(\text{total})} Q_{151(\text{total})}) - (C_e Q_e)}{(Q_{151(\text{total})} - Q_e)}$$

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(6) Calculate the allowable effluent flow ($Q_{allowable}$) expected to result in 1500 mg/L (if the SSC during spawning is not approved in time for use in the final permit, 1500 would be replaced by 500 or 1000 depending on ADEC action on the TDS criterion) TDS at Station 151 using the following equation:

$$Q_{allowable} = \frac{Q_{151} (1500 - C_{151})}{(C_e - 1500)}$$

STATION 160

(1) Measure the conductivity at Station 160

(2) Calculate the total TDS concentration at Station 160 ($C_{160(total)}$) using the measured conductivity of Station 160

(3) Measure the total flow at Station 160 ($Q_{160(total)}$)

(4) Calculate the flow at Station 160 (Q_{160}) minus the effluent flow at Station 160 by using the equation:

$$Q_{160} = Q_{160(total)} - Q_e$$

(5) Calculate the TDS concentration at Station 160 (C_{160}) minus the TDS contribution from the effluent using the following equation:

$$C_{160} = \frac{(C_{160(total)} Q_{160(total)}) - (C_e Q_e)}{(Q_{160(total)} - Q_e)}$$

(6) Calculate the allowable effluent flow ($Q_{allowable}$) expected to result in 500 mg/L TDS at Station 160 using the following equation:

$$Q_{allowable} = \frac{Q_{160} (500 - C_{160})}{(C_e - 500)}$$

(7) The $Q_{allowable}$ calculated above must be compared to the $Q_{allowable}$ calculated for Station 151. The permittee must discharge at the more restrictive $Q_{allowable}$.

Calculations of TDS concentrations based on conductivity shall be made using correlation curves that are based on TDS and conductivity measurements made pursuant to this permit.

h. After the end of each discharge season, the permittee shall submit a report, with the final DMR for the season, which compares the calculated TDS values in Main Stem Red Dog Creek and Ikalukrok Creek (based on the measured conductivity in the creeks) to the actual measured values. The report shall include the following information:

- (1) Measured TDS concentration at the edge of the mixing zone in Main Stem Red Dog Creek and at Station 151, and the date and time each sample was taken,
- (2) Measured conductivity at Station 151, and predicted TDS concentration at Station 151 at the date and approximate time the samples were taken in I.7.k.(1) (i.e., within one hour of sample collection),
- (3) Measured TDS concentration at Station 160, and the date and time each sample was taken,
- (4) Measured conductivity at Station 160, and predicted TDS concentration at Station 160 at the date and approximate time the samples were taken in I.7.k.(3) (i.e., within one hour of sample collection).

B. Construction Camp Site Requirements:

The permittee is authorized to discharge treated domestic wastewater from the Construction Camp through Outfall 002 into the tundra provided the following effluent limits and monitoring requirements are met:

1. Samples collected shall be representative of the effluent discharged without dilution from or contact with other sources. The permittee shall collect the samples after the last treatment unit prior to discharge.
2. The date of sampling shall be recorded. Results of the sample analyses shall be submitted monthly with the DMRs.
3. a. Table 3.

TABLE 3
Effluent Limitations and Monitoring Requirements for Outfall 002

Parameter ¹	7-Day Average	30-Day Average	Daily Maximum	Units	Sampling Frequency	Sample Type ²
Flow	--	--	--	gpm	Daily	Recording
Biochemical Oxygen Demand (BOD ₅) Influent & effluent	45	30	60	mg/L	1/month	Composite
Biochemical Oxygen Demand (BOD ₅) Influent & effluent	--	--	--	lb/day	1/month	Composite
Total Suspended Solids (TSS) Influent & effluent	45	30	60	mg/L	1/month	Composite

TABLE 3

Effluent Limitations and Monitoring Requirements for Outfall 002

Parameter ¹	7-Day Average	30-Day Average	Daily Maximum	Units	Sampling Frequency	Sample Type ²
Total Suspended Solids (TSS) Influent & effluent	—	—	—	lb/day	1/month	Composite
Fecal coliform	—	20	40	#/100 ml	1/month	Grab
Total Residual Chlorine ³	—	9.01	18.07	ug/L	1/month	Grab
Ammonia as N	—	—	—	mg/L	1/quarter	Grab
pH	See Permit Part I.B.3.c.			s.u.	1/month	Grab
Dissolved Oxygen	See Permit Part I.B.3.d.			mg/L	1/month	Grab

1 – For additional monitoring requirements see Permit Part I.B.3.b.

2 – Composite samples of effluent shall be composed of a mixture of four discrete grab samples of effluent. The grab samples shall be collected and combined within a 24 hour period. Each grab sample shall be collected and stored in accordance with procedures prescribed in Standard Methods, 18th, 19th or 20th Editions.

3 – TRC shall be analyzed immediately after sample collection using the DPD method approved by EPA

- b. The permittee must not discharge any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.
- c. The pH must not be less than 6.5 standard units (s.u.) or greater than 8.5 standard units (s.u.).
- d. Dissolved Oxygen (DO) must be greater than 7 mg/L but less than 17 mg/L.
- e. Percent removal for BOD₅ and TSS must be reported monthly on the DMR. Percent removal requirements for BOD₅ and TSS are as follows: for any month, the monthly average effluent load shall not exceed 15 percent of the monthly average influent load. Loading shall be calculated using the following formula:

$$8.34 \times \text{pollutant concentration (mg/L)} \times \text{daily flow (mgd)}$$

- f. For purposes of calculating monthly averages, zero may be assigned for values less than the MDL, the {numeric value of the MDL} may be assigned for values between the MDL and the ML. If the average value is less than the MDL, the permittee must report "less than {numeric value of the MDL}" and if the average value is less than the ML, the permittee must report "less than {numeric value of the ML}." If a value is equal to or greater than the ML, the permittee must report and use the actual value. The resulting average value must be compared to the effluent limitation to assess compliance.

- g. Valid test results from split samples shall be reported on the DMR. For reporting an average on the DMR, individual valid results for each test from a split sample are averaged first to determine a sample value. That value is averaged with other sample results obtained in the reporting period and the average of all sample results reported. For reporting the maximum on the DMR, individual valid results for each test from a split sample are averaged first to determine a sample value. That value is compared to other sample results obtained in the reporting period and the maximum of all sample results reported. For the purposes of reporting, split samples are reported as a single sample regardless of the number of times it is split. All laboratories used shall be identified on the DMR attachment.

C. Other Requirements.

1. Mine drainage shall be:
 - a. directed into the tailings impoundment; or
 - b. retained until it can be treated.
2. The permittee shall ensure that precipitation falling on the overburden stock pile shall be directed into the tailings impoundment.
3. Mine seepage from the ore site shall be collected by the Dirty Water Ditch. The water in the Dirty Water Sump shall be:
 - a. pumped into the tailings impoundment; or
 - b. retained until it can be treated.
4. When water in the Dirty Water Sump is pumped into the tailings impoundment, the pumped volume shall be recorded. The total volume pumped for each month shall be recorded and reported with the DMR for that month.
5. The permittee shall ensure that water in the Dirty Water Sump does not leak into Red Dog Creek.
6. Water in the Seepage Pond and related seepages, at the base of the tailings impoundment dam, shall be pumped back into the tailings impoundment, pumped to the high density solids treatment facility, or recycled through the mill.
7. The permittee shall ensure that water in the Seepage Pond does not leak into Red Dog Creek.
8. The permittee shall ensure that water in the tailings impoundment does not leak into Red Dog Creek. The permittee shall immediately pursue corrective actions if any water in the tailings impoundment leaks into Red Dog Creek.

9. The permittee may use treated wastewater as a dust suppressant on roads, pads and airport runways within the jurisdiction of this permit. Best management practices shall be used to insure that all waters sprayed do not drain into waters of the U.S. The permittee shall not use untreated wastewater as a dust suppressant.
10. The permittee shall not use treated wastewater as a dust suppressant on the haul road to the port.
11. The permittee shall ensure that operations at Red Dog Mine do not cause downstream water quality problems, such as the exclusion of fish or fish kills in Ikalukrok Creek or the exclusion of fish migrating up the North Fork of Red Dog Creek.

D. Ambient Monitoring Requirements

1. The permittee shall collect samples at the ambient monitoring stations listed below (see Permit Part VI. Ambient Monitoring Sampling Stations).
TCAK has proposed replacing Station 73 with Station 150 (although proposing to replace Station 73 ambient monitoring with Station 160 monitoring) and Station 10 with Station 151. A map is included in Permit Part VI.

Station 2: Wulik River
Station 150: downstream edge of the mixing zone in Ikalukrok Creek downstream of confluence with Red Dog Creek.
Station 9: Ikalukrok Creek upstream of confluence with Red Dog Creek.
Station 151: downstream edge of the mixing zone in Red Dog Creek
Station 12: North Fork Red Dog Creek
Station 20: Middle Fork Red Dog Creek upstream of the confluence with North Fork Red Dog Creek
Station 140: Middle Fork Red Dog Creek upstream of the influence of outfall 001
Tributaries: ~~Immediately upstream of where each tributary empties into the "clean" water ditch.~~

2. Ambient monitoring shall be conducted when there is flowing water (under ice or during open water conditions). For example, if there is flowing water at Station 151, but not at the other stations, the permittee shall sample at Station 151.
3. Ambient monitoring, outlined in this section, may be discontinued when the permittee has ceased discharging from Outfall 001 to Middle Fork Red Dog Creek for a period of 30 consecutive days. Ambient monitoring shall recommence when the permittee re-initiates a discharge from Outfall 001.
4. All ambient samples shall be grab samples.
5. The date of ambient sampling shall be recorded.

6. Ambient monitoring results for Stations 151 and 160 shall be submitted to EPA, ADEC, and OHMP with the monthly DMR. Other ambient monitoring results shall be submitted in the Annual Water Monitoring Summary Report required in Permit Part I.J

7. The following ambient monitoring shall be conducted:

The changes highlighted in this Table compare what is proposed to what was in the current permit.

TABLE 4 – Ambient Monitoring Requirements

Parameter ¹	Station 2	Station 73 160 ²	Station 9 ²	Station 150	Station 10 151 ²	Station 12 ²	Station 20	Station 140 ²	Tributary ³
Aluminum	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Cadmium	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Chromium	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Copper	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Cyanide ³ , total, $\mu\text{g/L}$	1/month	2/month	---	---	2/month	---	---	---	---
Cyanide ⁴ , WAD, $\mu\text{g/L}$	---	---	---	---	2/month	---	2/month	---	---
Iron	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Lead	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Manganese	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Nickel	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Selenium	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Silver	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Zinc	1/month	2/month	2/month	---	2/month	2/month	---	2/month	1/month
Total ammonia as N, mg/L	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Conductivity, $\mu\text{mhos/cm}$	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Hardness, mg/L CaCO_3	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Temperature, $^{\circ}\text{Celsius}$	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Total Dissolved Solids (TDS), mg/L	1/month	1/week	2/month	1/week	1/week	2/month	---	2/month	---
TDS Anions and Cations ⁵	---	1/month	---	1/month	1/month	---	---	---	---

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TABLE 4 – Ambient Monitoring Requirements

Parameter ¹	Station 2	Station 73 ²	Station 9 ²	Station 150	Station 40 151 ²	Station 12 ²	Station 20	Station 140 ²	Tributary ²
pH, standard units	1/month	2/month	2/month	---	2/month	2/month	---	2/month	---
Dissolved Oxygen ⁵ , mg/L	3/month	3/month	—	—	3/month	—	—	—	—
Hydrogen Sulfide ⁶ , mg/L	3/month	3/month	—	—	3/month	—	—	—	—
Turbidity, NTU	---	---	---	---	---	3/month	---	3/month	---
Whole Effluent Toxicity ⁶ , TU _c	---	---	1/month	---	---	1/month	---	---	---

1. Monitoring for metals shall be in ug/L and total recoverable unless otherwise noted. For additional monitoring requirements for aluminum, cadmium, chromium, copper, cyanide, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc see section I.A.5.b.
2. The permittee shall spread out the sample collection dates so that the samples collected are representative of the calendar month. To the extent practicable, ambient monitoring shall coincide with effluent monitoring. If weather, safety, shipping, and other environmental constraints prevent the permittee from collecting representative samples, the permittee shall document the condition which prevented the representative samples from being collected on the discharge monitoring reports.
3. For additional monitoring requirements for cyanide, see Permit Part I.A.6.
4. The permittee shall notify the ADEC and the OHMP immediately by telephone when WAD cyanide concentrations exceed the detection limit of 3 ug/L.
5. This monitoring shall include a standard and complete suite of those cations and anions contributing to TDS including, but not limited to, carbonates, chlorides, sulfates, potassium, magnesium, calcium, and sodium. The carbonate analysis may be estimated based on direct measurement of alkalinity.
6. See Permit Part I.G. for additional testing requirements.

8. Streamflow shall be determined daily at Stations 2, 8, 9, 151, 12, and 140. Streamflow shall be determined using standard methods recognized by the U.S. Geological Survey: gauging station data, discharge measurement, estimation using all available information. With the exception of the sites where streamflow estimates are made by adding or subtracting measured or gauged tributary flows, estimates must not be the sole means of determining flow at a site at all times; some discharge measurements shall be made for verification. The definition of "discharge measurement" is included in the definition section of this permit.

Streamflow data and the methods used to determine streamflow shall be submitted to EPA and ADEC monthly with the DMR.

E. Precipitation and Evaporation Monitoring Requirements.

1. The permittee shall establish and maintain monitoring stations at the mine site to determine the net annual precipitation rate.

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2. The precipitation and evaporation monitoring program shall begin on the effective date of this permit and end on the expiration date.
3. Precipitation (rain and snow) data shall be recorded daily. The permittee does not need to check the rain gauge on the days with no precipitation. However, the permittee shall record that the precipitation was zero on that day.
4. Evaporation data shall be recorded daily from June 1 to August 31 every year. Evaporation data shall be gathered earlier if the evaporation pan is not frozen. The permittee shall operate the evaporation pan properly to assure that the daily evaporation rate can be determined.
5. Spring snow pack readings shall be taken before spring melt each year. For snow pack readings, the measurement shall be reported with the Annual Report described in Permit Part I.J.
6. Records of precipitation and evaporation monitoring shall include:
 - a. The date and time of readings;
 - b. The name(s) of the individual(s) who performed the readings; and
 - c. Signature(s) of the individual(s) who performed the readings.
7. The precipitation and evaporation monitoring records shall be kept on site and made available to EPA and ADEC upon request.
8. The total precipitation and total evaporation rates shall be reported with the Annual Report described in Permit Part I.J.

F. Bioassessment Program Requirements.

The following sections have been highlighted to show a comparison between what was in the current permit and what is proposed in the draft permit.

- ~~1. During the period beginning on the effective date of the permit and lasting through the expiration date, the permittee shall perform the following bioassessment program every year to monitor and evaluate changes that may occur as a result of activities associated with the wastewater discharge from the mine. The permittee may elect to incorporate conditions of part I.F.1 into the plan prepared under part I.F.2 in order to avoid duplicative requirements.~~
 - ~~a. The permittee shall monitor and record the fisheries use (especially Dolly Varden and arctic grayling) of North Fork Red Dog Creek, Red Dog Creek, Anxiety Ridge, and Ikalukrok Creek during the ice free season using appropriate sample techniques, e.g., minnow traps, visual surveys. Number of species, estimated age, size, type of species, any external abnormality, and fish condition shall be recorded.~~

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b. The permittee shall analyze and record the concentrations of zinc, lead, copper, aluminum, cadmium, and selenium in muscle, gill, liver, and kidney from adult Dolly Varden in the Wulik River. The permittee shall collect this information twice per year, once during the fall prior to freeze-up (minimum sample size of six fish) and once in the spring after breakup (minimum sample size of six fish).

c. The permittee shall use aerial surveys to estimate the number of adult Dolly Varden overwintering in the Wulik River from mouth to a point approximately five miles upstream of the confluence of Ikalukrok Creek and Wulik River.

2. 1. Bioassessment conditions required by the Alaska Department of Environmental Conservation Certificate of Reasonable Assurance: Within 60 days of the effective date of the permit, the permittee shall submit for review and approval to ADEC and OHMP, an updated version of the Biomonitoring Plan – ADF&G Methods for Aquatic Life Monitoring to Satisfy requirements under 1998 NPDES Permit – submitted by Cominco Alaska, Inc., 1998, which was designed to detect possible aquatic community changes related to the mine effluent as follows:

TABLE 6 – Bioassessment Sites

Sample Site	Factors Measured
Middle Fork Red Dog Creek	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance
North Fork Red Dog Creek	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use
Main Stem Red Dog Creek	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use
Ikalukrok Creek Stations 9, 7, and upstream and downstream of Dudd Creek	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use
Ikalukrok Creek	Fall aerial survey of returning chum salmon
Wulik River	Metals concentrations in Dolly Varden gill, liver, muscle, and kidney. Fall aerial survey of overwintering Dolly Varden
Anxiety Ridge	Fish presence and use
Evaingiknuk Creek	Fish presence and use
Buddy Creek	Fish presence and use
	Cells with this marking are proposed to be included in the State's Solid Waste Permit
	Cells with this marking are proposed for deletion.

Upon approval, the permittee shall implement the plan annually.

3.2. The permittee shall submit annual reports which summarize the results of the bioassessment program to EPA and ADEC by March 1st of the next year with the Annual Water Monitoring Summary Report, see Permit Part I.J.

G. Whole Effluent Toxicity Testing

Toxicity tests shall be performed once per month on samples from the effluent, and on ambient water from Stations 9 and 12.

1. Test Species and Methods:

- a. The permittee shall conduct short-term tests with the water flea, *Ceriodaphnia dubia* (survival and reproduction test), and the fathead minnow, *Pimephales promelas* (larval survival and growth test).
- b. The presence of chronic toxicity shall be estimated as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, most recent edition, EPA/600-4-91-002.

2. Quality Assurance

- a. Toxicity tests shall include a control and at least 5 other dilutions that bracket the percent dilution offered by the mixing zone including 100% effluent.
- b. If organisms are not cultured in-house, concurrent testing with reference toxicants shall be conducted. Where organisms are cultured in-house, monthly reference toxicant testing is sufficient.
- c. If either the reference toxicant tests or the effluent tests do not meet all test acceptability criteria (TAC) as specified in the test methods manual, then the permittee must re-sample and re-test as soon as possible.
- d. Reference toxicant test shall be conducted using the same test conditions as the effluent toxicity test (i.e., same test duration, etc.).
- e. Control and dilution water shall be laboratory water. In no case shall water that has failed the TAC be used for dilution or control water.
- f. Effluent Chemical Testing: Chemical specific testing for the parameters listed in Permit Part I.A.1. shall be performed on a split sample collected for WET testing. If the timing of sample collection for WET coincides with the sample collection required in Permit Part I.A.1., then the chemical analysis of the split sample will fulfill the requirements of Permit Part I.A.1.